State of California The Resources Agency

Memorandum

Date: October 15, 2007

To: John Kirlin
Executive Director
Delta Vision Task Force
The Resources Agency
1416 Ninth Street
Sacramento, California 95814

From: **Department of Water Resources**

Subject: Sea Level Rise in the Suisun Marsh and Sacramento-San Joaquin Delta

On September 19, 2007, you asked the Department of Water Resources (DWR) for assistance in two areas related to sea level rise in the Suisun Marsh and Sacramento-San Joaquin Delta.

(1) Determining the effects of sea level rise (SLR) on water levels in the Suisun Marsh and Delta for both the 70-100 cm SLR and the extreme projection of 100-140 cm SLR (assumed at Golden Gate) by the CALFED Independent Science Board.[1,2]

Our preliminary modeling analysis[3] indicates that for planning purposes, the amount of sea level rise in the Suisun Marsh and the central Delta can be assumed to be the same as the amount of sea level rise at the Golden Gate. In other words, a one-foot rise in sea level at the Golden Gate can be assumed to cause a one-foot increase in water levels in the Suisun Marsh and the central Delta. Further inland, though, the amount of increase in water levels would likely be less than the amount of sea level rise at the

[1] Although not originally stated, in a subsequent conversation with you on September 27, 2007, you said that these sea level rise projections were for 2100.

[2] We note that the sea level rise projections recommended by the CALFED Independent Science Board (ISB) are considerably higher than the projections made recently by the Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report (IPCC, 2007). It is also interesting to note that *actual* sea level rise—not a projection—at the Golden Gate has in fact attenuated in recent years. Considering the many and varied uncertainties in climate change science, we will likely continue to encounter an evolution in sea level rise projections. We therefore urge due care and deliberation in establishing sea level rise ranges for widespread planning purposes in the Suisun Marsh and the Delta, as well as San Francisco Bay, which are significantly different than IPCC projections.

[3] For this preliminary analysis, DWR's Delta Simulation Model 2 (DSM2) was run for two scenarios, a base case and a two-foot (or 60 cm) rise in sea level. Increases in water levels at some key locations in the Delta due to sea level rise were computed for three different flow conditions (representing fall, winter, and flood flows). It is important to also note that DSM2 assumes the current configuration of San Francisco Bay, Suisun Marsh, and the Sacramento-San Joaquin Delta. Further, because of model limitations, we were unable to analyze sea level rise greater than two feet.

Golden Gate, depending upon several factors, such as the amount of freshwater inflow into the Delta and potential flooding of low lying areas. For instance, increases in Delta water levels further inland (e.g. upstream of Rio Vista on the Sacramento River) due to sea level rise would be higher during low freshwater inflow periods and lower during high freshwater inflow periods.

(2) A discussion of possible adaptation responses (policies, investments, operational changes, or ...[sic]) organized into three categories/ranges of SLR: (1) 30-55 cm, (2) 70-100 cm and (3) 100-140 cm.

DWR adaptation responses to sea level rise can be simplified into two areas: 1) those responses directly on behalf of the State Water Project (SWP); and 2) statewide responses.[4]

State Water Project

In general, adaptation responses to sea level rise for SWP facilities and operations would vary depending upon many factors, including State policies and budgetary priorities. As with current SWP projects--such as the South Delta Improvements Program, the Through-Delta Facility and Delta Cross Channel Reoperation, or various projects at Clifton Court Forebay--these responses would likely focus on improvements in water supply, water quality, and fish protection.

(1) Sea Level Rise of 30 – 55 cm (12 – 22 inches)

Modifications to the structural design of existing and proposed facilities would be one adaptation response to sea level rise. This approach could be phased in over the life expectancy of the project and adjusted as improved estimates for sea level rise and its propagation into the Delta are provided. In addition, modifications to facility and/or system operations could similarly be addressed (i.e. in a phased approach over time) in response to actual sea level rise. This approach may also entail adjustments in regulatory requirements, such as water quality standards, that may no longer be applicable at higher sea levels.

[4] As background on the recent use of sea level rise projections for Delta planning, the ISB's lower range of sea level rise in the Delta (30 – 50 cm or 12 – 22 inches) is significantly greater than the amount proposed by the CALFED Levee System Integrity Program Plan to address sea level rise. That plan included the recommendation that "a 3- to 6-inch sea-level rise be assumed for a 50-year planning horizon for the San Francisco Bay Area" (CALFED, 2000). Accordingly, only a handful of the ongoing planning studies concerning the Delta have addressed larger sea level rise projections than those originally proposed by CALFED. That being said, in 2006, DWR modified the design of foundations for the proposed gates in the South Delta Improvements Program to accommodate up to one foot of sea level rise. Similarly, DWR's July 2006 climate change report conducted preliminary analyses of one foot of sea level rise in the Delta.

(2) Sea Level Rise of 70 – 100 cm (28 – 39 inches)

No DWR studies have addressed sea level rise projections in this range. While DWR could take similar responses as described above, the costs and feasibility of adapting the SWP to sea level rise in the upper end of this range may become prohibitive.

(3) Sea Level Rise of 100 – 140 cm (39 – 55 inches)

Likewise, there are no DWR studies that have addressed sea level rise projections in this range. Again, while similar responses could be taken as described for the lower range of sea level rise, the costs and feasibility of adapting the SWP to sea level rise in this upper range may become prohibitive.

Please note that the US Bureau of Reclamation is also an implementing agency for the CALFED Conveyance Program, with responsibilities for facilities and operations in the Delta. As we were unable to coordinate this response with them due to the short timeline of this request, we strongly encourage Delta Vision to obtain similar input from them and other entities (e.g., Port of Stockton) that may also be affected by sea level rise.

Statewide

From a statewide perspective, adaptation responses would be aligned with the *California Water Plan Update 2005*, specifically, the Update's second initiative focusing on Integrated Regional Water Management (IRWM). This initiative involves the implementation of a diverse portfolio of water management strategies at the local and regional levels. As you may know, DWR is already proceeding with the next Update of the California Water Plan, a primary focus of which is the development of adaptation responses to climate change. While the planning horizon for the current Water Plan Update may extend to 2050, there is under active consideration the inclusion of a climate change scenario that extends to 2100, in order to highlight the need for long-term adaptation. Moreover, DWR is integrally involved in all major Delta planning efforts, including the Delta Risk Management Study and the Bay-Delta Conservation Plan, as well as the CALFED Bay-Delta Program and Delta Vision. Along with the California Water Plan Update, DWR intends to use the findings of these various planning processes to inform adaptation responses for California water management.

I thank you for the opportunity to be of service to Delta Vision again. If you have any questions or should you require any additional assistance in this matter, please contact me or your staff may contact John Andrew at (916) 651-9657 or jandrew@water.ca.gov.

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